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| 09/299,874 | 04/27/1999 | SEIJI HASHIMOTO | 862.2798 | 3802 |

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FITZPATRICK CELLA HARPER & SCINTO
30 ROCKEFELLER PLAZA
NEW YORK, NY 10112

EXAMINER

TRAN, NHAN T

| ART UNIT | PAPER NUMBER |
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2615

DATE MAILED: 03/01/2004

19

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/299,874

Applicant(s)

HASHIMOTO ET AL.

Examiner

Nhan T. Tran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 December 2003.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>15 & 16</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-5, 7, 8, 17 & 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Bird (US 5,721,422).

Regarding claim 1, Bird discloses an image sensing apparatus having a plurality of unit cells (1 unit = 4 pixels), each including a plurality of photoelectric conversion elements (10A-D) and a common circuit (either vertical circuit 2, 3, 11 or horizontal circuit 1, 4, 21 shown in Figs. 5 and 7) shared by the plurality of photoelectric conversion elements, arranged in either one or two dimensions (col. 3, lines 4-15 & col. 4, lines 51-55),

wherein a distance between a center of mass of photo-receiving areas (8) of adjoining photoelectric conversion elements (10A & 10C) included in a given unit cell is substantially equal to distances between the center of mass of the photo-receiving areas (8) of the adjoining

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photoelectric conversion elements (10A & 10C) included in different unit cells (other groups of 10A-D by extending Fig. 5 to include the other groups shown in Fig. 7) at least in one direction (i.e., column direction), and a distance between the center of mass of the photo-receiving area of a photoelectric conversion element (i.e., 10C) included in the given unit cell and the center of mass of the photo-receiving area of the adjoining photoelectric conversion element (i.e., the other 10C) included in an adjoining unit cell (the right below group) as shown in Figs. 5 and 7.

It should be noted that all pixels have the same size and all horizontal circuits also have the same size as illustrated in Fig. 5. Therefore, the distance between a center of mass between two adjacent pixels, at least in vertical direction, is substantially equal.

Regarding claim 2, Bird clearly shows that the plurality of photoelectric conversion elements in each unit cell are arranged side by side in one direction, and the common circuit is arranged at the edge of each plurality of photoelectric conversion elements (see Figs. 5 & 7).

Regarding claim 3, it is also clear that the plurality of photoelectric conversion elements in each unit cell are arranged sided by in one direction (i.e., horizontal direction), and a common circuit (i.e., vertical circuit 2) is arranged in a direction perpendicular to the direction of the arrangement of the plurality of photoelectric conversion elements (see Fig. 7).

Regarding claim 4, as also shown in Fig. 7, the common circuit (i.e., horizontal circuit 1, 4, 21) is arranged at the edge of each plurality of photoelectric conversion elements arranged in a horizontal direction.

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Regarding claim 5, Bird further discloses that the unit cell is configured with a plurality of pixels (e.g., 4 pixels) each including a photoelectric conversion element (10), and a number of horizontal conductors passing over each pixel is the same (see Fig. 5, wherein each pixel has one horizontal conductor, i.e., 1, 21, 4 passing over).

Regarding claim 7, as shown in Figs. 5 & 7, the common circuit (2, 3, 11) is arranged at the edge of each plurality of photoelectric conversion elements arranged in vertical direction.

Regarding claim 8, Figs. 5 & 7 also show that the number of vertical conductors passing over each is the same for each unit cell.

Regarding claim 17, Bird further shows a sense amplifier (78) disposed in the common vertical circuit (11) for amplifying and outputting a signal from each of the photoelectric conversion means (see Fig. 7; col. 8, lines 5-9).

Regarding claim 20, as shown in Fig. 7, each sense amplifier (78) represents signal processing unit.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 10-16 & 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bird (US 5,721,422) in view of Takahashi (US 5,955,753).

Regarding claim 10, Bird does not disclose noise reading means for reading noise of the common circuit; first signal reading means for reading a first signal through the common circuit; second reading means for reading a second signal through the common circuit; and noise reduction means for reducing the noise from the first and second signals.

Takahashi teaches noise reading means (8, 10 in Fig. 1) for reading a noise of a common circuit of vertical transfer, first signal reading means (8) for reading first signal (noise signal TN) through the common circuit and store the noise signal in a capacitor (10), second signal reading means (9) for reading a second signal (signal TS) through the common circuit, and noise reduction means (differential amplifier 14) so that random noise and fixed pattern noises of pixels are eliminated (see Fig. 1; col. 4, line 61 – col. 5, line 9).

Therefore, it would have been obvious to one of ordinary skill in the art to enhance the imaging device in Bird by enabling a noise reduction circuits to read a first signal and second

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signal through the common vertical circuit and thereby eliminating random noise and fixed pattern noises of pixels.

Regarding claim 11, Takahashi discloses the differential amplifier (14) to reduce noises as shown in Fig. 1; col. 4, lines 61 – col. 5, line 9.

Regarding claim 12, Takahashi shows that the first signal is read from one of the plurality of photoelectric conversion elements (i.e., 30-11) in each unit cell, and the second signal is read from another photoelectric conversion element (i.e., 30-21) in the same unit cell (see col. 5, lines 2-9).

Regarding claim 13, Takahashi also discloses the first signal is read from one (30-11 of the first line) of the plurality of photoelectric conversion elements in each unit cell, and second signal is read from a photoelectric conversion element (30-31) and another photoelectric conversion element (30-21) in the same unit cell (see col. 6, lines 40-49).

Regarding claims 14-16, see the analysis in claims 10-12, respectively.

Regarding claim 18, Bird shows that the common circuit includes transfer means (conductor connected to vertical circuit 11) for transferring the signal from each of the plurality of photoelectric conversion element (Fig. 7). Bird does not explicitly teach that the vertical circuit (vertical transfer) further includes reset means for resetting the circuit.

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Takahashi teaches a transistor (7) connected to each common vertical transfer circuit to reset the vertical transfer circuit (Fig. 1; col. 4, lines 19-21).

Therefore, it would have been obvious to one of ordinary skill in the art to achieve a better signal integrity carried by the vertical transfer circuit in Bird by providing a vertical reset means for resetting the each vertical transfer circuit at each scanning period.

4. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bird (US 5,721,422) in view of Fossum et al (US 6,021,172).

Regarding claim 19, Bird does not teach that the common vertical circuit includes an A/D converter. As taught by Fossum, an A/D converter array is connected to vertical transfer array to enable digital signal output (see Fig. 6).

Therefore, it would have been obvious to one of ordinary skill in the art to reconfigure the imaging device in Bird to enable digital signal output as an alternative implementation using an A/D converter array that is connected to vertical transfer array to convert analog signal output from plurality of pixels to digital signal for a specific digital imaging application.

5. Claim 83 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bird (US 5,721,422).

Regarding claim 83, Bird discloses an imaging apparatus having all the limitations including an inherent control unit to control overall operation of the imaging apparatus in order

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to function as disclosed, except for disclosing a lens unit that projects incoming light onto the unit cells. However, such an imaging apparatus would be used in a camera for capturing an object image through a lens unit as well known in the art.

Therefore, it would have been obvious to one of ordinary skill in the art to use such an image sensing apparatus in Bird for capturing an object image through a lens unit in a camera as one of its implementations.

6. Claims 6 & 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bird (US 5,721,422) in view of Nakashiba (US 5,442,396).

Regarding claim 6, Bird teaches unit cell being configured with a plurality of pixels each including a photoelectric conversion element as shown in Figs. 5 & 7. Bird does not clearly show that contacts between layers of each pixel are arranged so that a number of conductors passing over each unit cell, as well as one of the contacts which not connected to a conductor passing over the unit cell in connected to a light-shield film of the pixel. However, as taught by Nakashiba, light shield film of each pixel is formed between the photoelectric conversion sections and vertical charge transfer regions and connected to plurality of conductors passing over plurality of pixels, wherein contacts between layers of each pixel is established by contact holes (27) so that readout characteristics for signal charges from photoelectric converting sections are improved (see Figs. 6 & 7A-D and Abstract; col. 3, lines 3-60. It is noted that contact holes 27 are power feeds to the power layer of each pixel).

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Therefore, it would have been obvious to one of ordinary skill in the art to modify Bird to include the teaching of Nakashiba so that contacts between layers of each pixel as well as one of other contacts which is not connected to a conductor is connected to a light-shield film of the pixel in order to improve readout characteristics.

Regarding claim 9, the claimed limitations are analyzed with respect to claim 6.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nhan T. Tran whose telephone number is (703) 605-4246. The examiner can normally be reached on Monday - Thursday, 8:00am - 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew B Christensen can be reached on (703) 308-9644. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

NT.



ANDREW CHRISTENSEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600